Vulnerability Assessment

Air Crashes

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** • Generally speaking, the higher the population density, the higher the likelihood of injuries and deaths. ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.	☐ **Buildings** • Tall buildings near or on airport take-off and landing paths. ☐ **Critical Facilities** ☐ **Ecological Sites** ☐ **Economic Sectors** • Air travel may decrease as a result of a major crash. • Tourism. ☐ **Historical and Cultural Sites** ☐ **Lifelines and Infrastructure** • Lifeline facilities near or on airport take-off and landing paths. ☐ **Non-structural property** ☐ **Recreational Land** ☐ **Structures** • Tall structures near or on airport take-off and landing paths.	☐ **Capability to respond** • Inadequate emergency response plans for both off and on airport incidents. • Lack of tested emergency response plans. ☐ **Community Education and Training** • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** ☐ **Warning Systems** • Lack of adequate weather forecasting programs. • Lack of prepared warning messages advising people of the need to evacuate areas at risk.	☐ **Time of Day** • Fewer planes are traveling between 2000h and 0600h. ☐ **Day of Week** ☐ **Time of Year** • Summer is the busiest time for air travel. • End of school and school start-up are very busy times. ☐ **Holidays** Major holidays are very busy times for air travel - especially Christmas time.

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Blizzards

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. • The elderly have difficulty because of a lack of vasoconstriction and the basic metabolic rate decreases with age. • The elderly appear to perceive cold less well than younger persons and may voluntarily set thermostats lower. • The relatively young can be more vulnerable because of skiing and other winter sports. • Those under <1 year of age, neonates, and premature babies have a large ratio of heat losing surface to heat-generating volume, a thin layer of insulating subcutaneous fat and an inability to control their environment. • Many elderly are often dependent upon prescription drugs and they may not have access to these drugs during a prolonged blizzard. ☐ **Density**	☐ **Buildings** • Old buildings not built to current building codes. ☐ **Critical Facilities** ☐ **Ecological Sites** • Sites of a delicate nature, located in unforested areas and not usually subject to blizzards. ☐ **Economic Sectors** • Sectors which are dependent upon urgent mail or cargo shipments (as transportation is generally severely affected by blizzards). • Greenhouses and dairy farms may be affected by ongoing blizzards. ☐ **Historical and Cultural Sites** • Old buildings not built to current building codes. ☐ **Lifelines and Infrastructure** • Unreinforced lifelines subject to damage by high winds. ☐ **Non-structural property** ☐ **Recreational Land** ☐ **Structures** • Unreinforced structures subject to damage by high winds.	☐ **Capability to respond** • Inadequate emergency response plans for blizzards. • Lack of tested emergency response plans. • Ensuring the population has access to sufficient and dry clothing. • Ensuring that there are properly heated buildings available as shelters.	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** • Winter. ☐ **Holidays** • Low staffing levels during holidays in communication and power facilities.

Blizzards cont'd...

People	Place	Preparedness	Time
☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • The poor are vulnerable since they may not be able to afford extra heat. • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery. ☐ **Miscellaneous** • Ethanol ingestion by middle aged alcoholics predisposes them to hypothermia, but ironically appears to improve survival. • Those persons with a protein -calorie malfunction. • Those with hypothyroidism.		☐ **Community Education and Training** • Community education and training programs, especially for new parents. • Education and training programs for recreationalists. • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training ☐ **Mitigation Program** • Enforcement of housing maintenance and occupancy ordinances. • Adequate thermal standards in nursing homes, hospitals, etc.. ☐ **Warning Systems** • Lack of adequate weather forecasting programs. • Lack of prepared warning messages advising people with vulnerabilities of symptoms of exposure to cold and the need seek warm shelter • Warnings to those on neuroleptic drugs.	

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Dam Failures

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** • Generally speaking, the higher the population density, the higher the likelihood of injuries and deaths. ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.	☐ **Buildings** ☐ **Critical Facilities** ☐ **Ecological Sites** • Many ecological sites are severely affected by rapid increases or decreases in water supply. ☐ **Economic Sectors** • Industries with high water use and high power use. • Businesses with high water use and high power use. • Agricultural sectors which use irrigation. ☐ **Historical and Cultural Sites** ☐ **Lifelines and Infrastructure** • Power lines. • Water lines. • Gas Pipelines. • Telephone lines. ☐ **Non-structural property** ☐ **Recreational Land** • Recreational land in dam floodway. ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans for dam failures. • Lack of tested emergency response plans. • lack of evacuation plans for dam floodway areas. ☐ **Community Education and Training** • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** • Lack of ongoing-monitoring of dam maintenance. ☐ **Warning Systems** • Lack of adequate weather forecasting programs. • Lack of prepared warning messages advising people to evacuate.	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** ☐ **Holidays**

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Drought

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Poverty - drought often leads to higher prices of food goods. • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.	☐ **Buildings** ☐ **Critical Facilities** • Hydro-electric power dams are vulnerable to drought situations. • Hospitals are extremely vulnerable to a lack of water. • Fire suppression services are vulnerable to a lack of water. ☐ **Ecological Sites** • Many fragile ecological sites are very vulnerable to drought conditions. ☐ **Economic Sectors** • Farms and areas of agricultural products are especially vulnerable to droughts. • Animal herds in areas such as cattle ranges are very vulnerable to droughts. • Forested areas. • Wildlife. • Areas which are dependent upon a single produce focus. • Tourism. ☐ **Historical and Cultural Sites** ☐ **Lifelines and Infrastructure** • Water pipelines. • Sewerage and sewage treatment plants. ☐ **Non-structural property** ☐ **Recreational Land** • Recreational land which depends upon an adequate water supply in order to be attractive (e.g. forest trails for hiking). • Lack of water increases the vulnerability of forests to forest fires. ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans. • Lack of tested emergency response plans. ☐ **Community Education and Training** • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** ☐ **Warning Systems** • Lack of adequate weather forecasting programs. • Lack of prepared warning messages advising people to reduce water usage	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** • Summer months ☐ **Holidays**

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Earthquakes

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee collapsing structures, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** • Death tolls can be very high when earthquake occurs in an urban area. • Those living alone are most often the last to be rescued - areas with a high singles population are more vulnerable. ☐ **Gender** • Women of all ages have a higher rate of serious injury.	☐ **Buildings** • Unreinforced masonry buildings are especially vulnerable. • Adobe buildings are very vulnerable. • "Modern" medium rise, concrete slab buildings are likely to collapse due to lack of supports. • Self-built buildings are more vulnerable • Brick chimneys may collapse. • Asbestos used in building increases the likelihood that the building may be inhabitable for some time following the quake. • Studies of the damage patterns in the 1971 San Fernando earthquake showed building professionals that nonductile concrete structures are prone to damage in strong earthquakes. • Lack of adequate space between buildings increases the likelihood that they will pound together. • Lack of quality construction and building inspections increases their vulnerability.	☐ **Capability to Respond** • Inadequate emergency response plans for both earthquakes. • Lack of tested emergency response plans. ☐ **Community Education and Training** • Lack of earthquake drills practiced in schools and in the community. • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training.	☐ **Time of Day** • Crowded bars and dancing places at night have typically been sites of many injuries following a quake. • Commuter rush hours when bridges, tunnels and transportation systems are in maximum use. ☐ **Day of Week**

Earthquakes cont'd...

People	Place	Preparedness	Time
☐ **Ethnicity** • The inability of minorities to get aid means that there is a longer period before economic recovery and thus it can mean a long term decline in the quality of life and standard of living. • Areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • It is common that most vulnerable sites and buildings of the worst quality are occupied by the poorest of the community. • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery. ☐ **Miscellaneous**	☐ **Critical Facilities** • Schools built prior to existing building codes and not seismically retrofitted. • Hospitals built prior to existing building codes and not seismically retrofitted. • Emergency Response Centres built prior to existing building codes and not seismically retrofitted. ☐ **Ecological Sites** ☐ **Economic Sector** • Existence of chemical and petroleum hazards which would contribute to fire and toxic combustion. • Hazardous waste sites. • Nuclear power plants. • Oil Refineries. • Tourism • Port Facilities and Docking Facilities. ☐ **Historical and Cultural Sites** • Unretrofitted buildings • Museum collections. ☐ **Lifelines and Infrastructure** • Unretrofitted rail lines may be damaged. • Failure of unretrofitted dams upstream may resulting in flooding. • Unretrofitted underground pipelines for natural gas. • Unretrofitted telephone networks. • Unretrofitted Hydro substations. • Unretrofitted Micro-towers. • Unretrofitted water systems. • Unretrofitted sewerage. • Unretrofitted bridges. • Unretrofitted airports.	☐ **Mitigation Program** • Retrofitting of older buildings. ☐ **Warning Systems**	☐ **Time of Year** • May cause flooding if quake occurs when rivers are at their peak. ☐ **Holidays**

Earthquakes cont'd...

	☐ **Non-structural property** • Unsecured furniture, ceiling tiles, bookcases, • Unsecured computer equipment. • Libraries. • Unsecured art collections. • Medical facilities. • Laboratories. ☐ **Recreational Land** • Recreational land with slopes and mountain which may be subject to landslides in an earthquake. ☐ **Structures** • Unreinforced structures.		

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Geo-Magnetic Storms

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability - in this case more as a result of power outages caused by the storms. ☐ **Density** ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.	☐ **Buildings** ☐ **Critical Facilities** • Because of computer and power outages, emergency response dispatch systems and major hospitals and other sites without backup power systems are vulnerable. • Power generating facilities. ☐ **Ecological Sites** ☐ **Economic Sectors** • Because of computer and power outages, businesses, banks, and other sites without backup power systems are vulnerable. • Television and other broadcasting sites. • Prolonged power outages affect greenhouses and dairy farms. • ☐ **Historical and Cultural Sites** ☐ **Lifelines and Infrastructure** • Power substations. ☐ **Non-structural property** ☐ **Recreational Land** ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans for geo-magnetic storms. • Lack of tested emergency response plans. ☐ **Community Education and Training** • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** ☐ **Warning Systems** • Lack of adequate weather forecasting programs. • Lack of prepared warning messages.	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** • Because of their ability to cause power blackouts, cold winters are a vulnerable time of the year. • Because of their ability to cause power blackouts, hot summers, when people are dependent upon air conditioners, are a vulnerable time of the year. ☐ **Holidays** • Low staffing levels during holidays in communication and power facilities.

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Hailstorms

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in	☐ **Buildings** • Damage to buildings (broken windows, paint removed, etc.). ☐ **Critical Facilities** ☐ **Ecological Sites** • Fragile ecological sites with many small plants. ☐ **Economic Sectors** • Crop destruction: wheat, barley, oats, rye and corn. • Greenhouses. • Airport hangers, small airports. • Car dealers and sites of stored new vehicles. ☐ **Historical and Cultural Sites** ☐ **Lifelines and Infrastructure** • Micro-wave towers. • Satellite dishes. • Transportation routes. ☐ **Non-structural property** ☐ **Recreational Land** ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans for hailstorms. • Lack of tested emergency response plans. ☐ **Community Education and Training** • Education and training programs for recreationalists. • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training ☐ **Mitigation Program** ☐ **Warning Systems** • Lack of adequate weather forecasting programs. • Lack of prepared warning messages advising people to take necessary precautions.	☐ **Time of Day** • 75% of all hail storms occur between 1200h and 1700h. ☐ **Day of Week** ☐ **Time of Year** • Hailstorms tend to occur in July in the corn growing areas of the midwest and August in the Prairie wheat growing areas. ☐ **Holidays**

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Hazardous Material Accidents - In Situ

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** • Generally speaking, the higher the population density, the higher the likelihood of injuries and deaths. ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.	☐ **Buildings** ☐ **Critical Facilities** ☐ **Ecological Sites** ☐ **Economic Sectors** ☐ **Historical and Cultural Sites** ☐ **Lifelines and Infrastructure** ☐ **Non-structural property** ☐ **Recreational Land** ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans for hazardous material accidents in-situ. • Lack of tested emergency response plans. ☐ **Community Education and Training** • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** ☐ **Warning Systems** • Lack of adequate monitoring and forecasting programs. • Lack of prepared warning messages advising people of the incident, actions to be taken and of evacuation routes.	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** ☐ **Holidays**

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Pearce, Laurie, Henry Hightower, Barry Konkin, Sophie Megalos, and James Pernu. (1993). *British Columbia Hazard, Risk and Vulnerability Analysis*. Vancouver, B.C.: DPRC, University of British Columbia.

Heat Waves

People	Place	Preparedness	Time
☐ **Age** • Those over the age of 65 are less likely to have the necessary cardiac output and have a decreased systemic vascular resistance. • Those over 65 have an increased body temperature at which sweating begins. • Those over 65 are less able to perceive differences in temperature and thus are less able to effectively regulate their thermal environments. • Those over 85 years of age are at increased risk. • Babies and those under 5 years of age are more at risk. • Children with congenital abnormalities of the central nervous system and diarrhea illnesses are more at risk. ☐ **Density** ☐ **Gender** • Males are more vulnerable in their teenage years perhaps of greater heat exposure and exertion exercise. • In all other cases, females are greater at risk. ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **General** • Use of electric fans not much use and may exacerbate heat stress. • Prior history of heatstroke and obesity increase vulnerability.	☐ **Buildings** • Increased risk in urban areas suggesting a sort of "dose response" effect of urbanization which results in higher temperatures • Tall buildings may reduce wind velocity, decreasing the contribution of moving air to evaporative and convective cooling. • Masses of brick, stone and concrete asphalt and cement absorb radiant heat from the sun and radiate it at night. ☐ **Critical Facilities** ☐ **Ecological Sites** ☐ **Economic Sector** • Agricultural crops are vulnerable to heat waves. ☐ **Historical and Cultural Sites** ☐ **Lifelines and Infrastructure** • Rail lines may be damaged. ☐ **Non-structural property** ☐ **Recreational Land** • Forest fires increase in heat waves. ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans for heat waves. • Lack of tested emergency response plans. • Emergency plan with ability to access shelter with air conditioning. ☐ **Community Education and Training** • Education and training programs for recreationalists. • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** ☐ **Warning Systems** • Lack of adequate weather forecasting programs. • Lack of prepared warning messages advising people with vulnerabilities to seek air-conditioned facilities.	☐ **Time of Day** • Mid-day. ☐ **Day of Week** ☐ **Time of Year** • Summer time, particularly if the heat wave is the early part of the summer before people body's have had time to adapt to warmer weather. ☐ **Holidays**

Heat Waves cont'd...

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Human Diseases - Human Transmitted

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** • Generally speaking, the higher the population density, the higher the likelihood of injuries and deaths. ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.	☐ **Buildings** ☐ **Critical Facilities** • Facilities with highly specialized jobs and little cross-training. • Hospitals and medical facilities. ☐ **Ecological Sites** ☐ **Economic Sectors** • Business and industries with a large labour pool running on minimum staffing. • Business and industries with highly specialized jobs and little cross-training. • Tourism. ☐ **Historical and Cultural Sites** ☐ **Lifelines and Infrastructure** ☐ **Non-structural property** ☐ **Recreational Land** ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans for human-transmitted diseases. • Lack of tested emergency response plans. ☐ **Community Education and Training** • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** • Vaccination programs. ☐ **Warning Systems** • Lack of adequate disease forecasting programs. • Lack of prepared warning messages advising people with vulnerabilities of symptoms and medical advice.	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** ☐ **Holidays**

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Ice Fogs and Ice Storms

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** • Generally speaking, the higher the population density, the higher the likelihood of injuries and deaths. ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.	☐ **Buildings** • Buildings built to previous building codes as roofs can be rendered unsafe by heavy ice loading. ☐ **Critical Facilities** • Because of resulting power black-outs and disrupted telephone services, dispatch systems and critical facilities without back-up power are vulnerable. ☐ **Ecological Sites** • Areas with young or very old trees can be severely damaged by heavy ice loading. ☐ **Economic Sectors** • Agricultural products can be killed. ☐ **Historical and Cultural Sites** • Buildings built to previous building codes as roofs can be rendered unsafe by heavy ice loading. ☐ **Lifelines and Infrastructure** • Transportation systems can be disrupted as highways and local roads become treacherous. ☐ **Non-structural property** ☐ **Recreational Land** ☐ **Structures** Structures built to previous building codes as roofs can be rendered unsafe by heavy ice loading.	☐ **Capability to respond** • Inadequate emergency response plans for both ice fogs and ice storms. • Lack of tested emergency response plans. • Ensuring the population has access to sufficient and dry clothing. • Ensuring that there are properly heated buildings available as shelters ☐ **Community Education and Training** • Education and training programs for recreationalists. • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** ☐ **Warning Systems** • Lack of adequate weather forecasting programs. • Lack of prepared warning messages advising people with vulnerabilities to seek warm facilities.	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** • Fall and winter. ☐ **Holidays**

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Landslides

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** • Generally speaking, the higher the population density, the higher the likelihood of injuries and deaths. ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.	☐ **Buildings** ☐ **Critical Facilities** ☐ **Ecological Sites** • River systems, spawning grounds, etc. can be severely damaged by landslides. ☐ **Economic Sectors** • Mining Industry. ☐ **Historical and Cultural Sites** ☐ **Lifelines and Infrastructure** • Unreinforced natural gas pipelines. • Unreinforced water and sewerage pipelines. • Transmission lines. • Unprotected main highways and arterial roads. • Unprotected bridges. ☐ **Non-structural property** ☐ **Recreational Land** • Can be severely affected by landslides. ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans for dealing with landslides. • Lack of tested emergency response plans. ☐ **Community Education and Training** • Education and training programs for recreationalists. • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** ☐ **Warning Systems** • Lack of adequate soil monitoring programs in areas of instability programs. • Lack of prepared warning messages advising people of evacuation procedures.	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** ☐ **Holidays**

References

Pearce, Laurie, Henry Hightower, Barry Konkin, Sophie Megalos, and James Pernu. (1993). *British Columbia Hazard, Risk and Vulnerability Analysis*. Vancouver, B.C.: DPRC, University of British Columbia.

Rail Accidents

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** • Generally speaking, the higher the population density, the higher the likelihood of injuries and deaths. ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.	☐ **Buildings** ☐ **Critical Facilities** ☐ **Ecological Sites** ☐ **Economic Sectors** ☐ **Historical and Cultural Sites** ☐ **Lifelines and Infrastructure** ☐ **Non-structural property** ☐ **Recreational Land** ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans for both off and on rail track incidents (e.g. train falling into river). • Lack of tested emergency response plans. ☐ **Community Education and Training** • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** ☐ **Warning Systems** • Lack of adequate weather forecasting programs.	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** ☐ **Holidays**

References

Pearce, Laurie, Henry Hightower, Barry Konkin, Sophie Megalos, and James Pernu. (1993). *British Columbia Hazard, Risk and Vulnerability Analysis*. Vancouver, B.C.: DPRC, University of British Columbia.

Riots

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** • Generally speaking, the higher the population density, the higher the likelihood of injuries and deaths. ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.	☐ **Buildings** ☐ **Critical Facilities** • Critical facilities such as police stations may become the target of riots. ☐ **Ecological Sites** ☐ **Economic Sectors** • Businesses, especially those along main streets near meeting places or spectator sports sites. ☐ **Historical and Cultural Sites** ☐ **Lifelines and Infrastructure** ☐ **Non-structural property** • Store front windows. • Goods on display along store fronts. • Cars parked on streets along congregation points. ☐ **Recreational Land** ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans for riots. • Lack of tested emergency response plans. ☐ **Community Education and Training** • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** ☐ **Warning Systems** • Lack of prepared warning messages advising people of actions they should be taking.	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** ☐ **Holidays**

References

Pearce, Laurie, Henry Hightower, Barry Konkin, Sophie Megalos, and James Pernu. (1993). *British Columbia Hazard, Risk and Vulnerability Analysis*. Vancouver, B.C.: DPRC, University of British Columbia.

Snow Storms

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. • The elderly have difficulty because of a lack of vasoconstriction and the basic metabolic rate decreases with age. • The elderly appear to perceive cold less well than younger persons and may voluntarily set thermostats lower. • The relatively young can be more vulnerable because of skiing and other winter sports. • Those under <1 year of age, neonates, and premature babies have a large ratio of heat losing surface to heat-generating volume, a thin layer of insulating subcutaneous fat and an inability to control their environment. • Many elderly are often dependent upon prescription drugs and they may not have access to these drugs during a prolonged snowstorm. ☐ **Density** ☐ **Gender**	☐ **Buildings** • Buildings built to previous building codes as roofs can be rendered unsafe by heavy snow loading. ☐ **Critical Facilities** ☐ **Ecological Sites** • Areas with young or very old trees can be severely damaged by heavy snow loading. ☐ **Economic Sectors** • Crops can be killed. ☐ **Historical and Cultural Sites** • Buildings built to previous building codes as roofs can be rendered unsafe by heavy snow loading. ☐ **Lifelines and Infrastructure** ☐ **Non-structural property** ☐ **Recreational Land** ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans for snow storms. • Lack of tested emergency response plans. • Ensuring the population has access to sufficient and dry clothing. • Ensuring that there are properly heated buildings available as shelters ☐ **Community Education and Training** • Education and training programs for recreationalists. • Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training.	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** ☐ **Holidays**

Snow Storms cont'd...

People	Place	Preparedness	Time
☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.		☐ **Mitigation Program** • Enforcement of housing maintenance and occupancy ordinances. • Adequate thermal standards in nursing homes, hospitals, etc.. ☐ **Warning Systems** • Lack of adequate weather forecasting programs.	

References

Pearce, Laurie, Henry Hightower, Barry Konkin, Sophie Megalos, and James Pernu. (1993). *British Columbia Hazard, Risk and Vulnerability Analysis*. Vancouver, B.C.: DPRC, University of British Columbia.

Phillips, David. (1993). *The Day Niagara Falls Ran Dry*! Canada: Key Porter Books.

Phillips, David. (1990). *Climates of Canada*. Ottawa, Canada: Canadian Government Publishing Centre, Supply and Services Canada.

Urban Wildfire Interface

People	Place	Preparedness	Time
☐ **Age** • For the elderly and the very young, lack of mobility to flee, inability to withstand trauma and exacerbation of underlying disease increase vulnerability. ☐ **Density** • Generally speaking, the higher the population density, the higher the likelihood of injuries and deaths. ☐ **Gender** ☐ **Ethnicity** • Generally speaking areas with a high ethnic and cultural composition are more vulnerable due to communication issues (e.g. inability to understand warnings, read educative and training information, etc.). ☐ **Socio-economic Status** • Generally speaking those poor sectors of the population are more vulnerable to any kind of disaster - factors include poorer health, less adequate shelter, less education and lack of funds to assist in their recovery.	☐ **Buildings** • Wooden buildings. • Buildings which are highly combustible. • Buildings with wooden shingles. ☐ **Critical Facilities** • Wooden buildings. • Buildings which are highly combustible. • Buildings with wooden shingles. ☐ **Ecological Sites** ☐ **Economic Sectors** ☐ **Historical and Cultural Sites** • Wooden buildings. • Buildings which are highly combustible. • Buildings with wooden shingles. ☐ **Lifelines and Infrastructure** ☐ **Non-structural property** ☐ **Recreational Land** • Forested areas. • Treed areas with deep, long roots. ☐ **Structures**	☐ **Capability to respond** • Inadequate emergency response plans for both urban wildfire interfaces. • Lack of tested emergency response plans. ☐ **Community Education and Training** • Education and training programs for recreationalists. • Training programs for homeowners so as to ensure that vegetation is kept away from one's home, etc.. Inadequate community emergency preparedness education and training programs, including neighbourhood preparedness training. ☐ **Mitigation Program** • Lack of regular home inspections to ensure that homeowners are not increasing the likelihood of wildfires spreading rapidly.	☐ **Time of Day** ☐ **Day of Week** ☐ **Time of Year** • Summer. • Periods of high winds. ☐ **Holidays** • People away for long weekends and holidays and thus lack of monitoring of potential fires.

Urban Wildfire Interface cont'd...

People	Place	Preparedness	Time
		• Lack of programs to decrease the likelihood of home fires (e.g. by-laws for asphalt roofs instead of shingles). • Inadequate fire protection services in outlying areas. • Lack of fire-breaks. ☐ **Warning Systems** • Lack of adequate weather forecasting programs. • Lack of prepared warning messages advising people of evacuation routes, etc..	

References

Pearce, Laurie, Henry Hightower, Barry Konkin, Sophie Megalos, and James Pernu. (1993). *British Columbia Hazard, Risk and Vulnerability Analysis*. Vancouver, B.C.: DPRC, University of British Columbia.